DOCUMENT RESUME

ED 239 145 CG 017 189

AUTHOR Kivlahan, Daniel R.; And Others
TITLE Alcoholic Subtypes: Validity of Clusters Based on Multiple Assessment Domains.
PUB DATE Aug 83
NOTE 18p.; Paper presented at the Annual Convention of the American Psychological Association (91st, Anaheim, CA, August 26-30, 1983).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Alcoholism; Behavior Patterns; Cluster Analysis; *Cluster Grouping; Demography; *Individual Differences; Males; *Predictive Validity; Predictor Variables; Program Effectiveness; Psychopathology

ABSTRACT

Recent approaches to empirical derivation and validation of alcoholic subtypes which involve cluster analysis wihin a single multivariate assessment domain have been questioned. To investigate more clinically meaningful subtypes in a sample of 245 male alcoholics, cluster analysis was performed on a combination of variables from four assessment domains: demographics, drinking behavior, neuropsychological functioning, and psychopathology. Six subtypes were derived and shown to have discriminant validity with respect to measures which had not been used in the original cluster analysis. The six subtypes were found to have differential patterns of treatment outcome over 9-month follow-up, but only among patients randomly assigned to 2-week as opposed to 7-week hospitalization. Cluster membership was not associated with marital status or reason for referral, but was related to the number of previous treatments for alcohol-related problems or psychiatric reasons, drinking-related locus of control, and physical symptoms. The results suggest that empirically derived typologies based on multiple assessment domains should be investigated for their usefulness in more appropriately matching treatments to patient subtypes. (Author/JAC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED239145

Alcoholic Subtypes:
Validity of Clusters Based on Multiple Assessment Domains

Daniel R. Kivlahan

Dennis M. Donovan

and

R. Dale Walker

Veterans Administration Medical Center

Seattle, Washington

and

Department of Psychiatry and Behavioral Sciences

University of Washington School of Medicine

Presented at the Annual Meeting of the American Psychological Association

Anaheim, California, August, 1983

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Daniel R. Kivlahan

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)"

CG 017189

Requests for reprints or additional information should be addressed to:

Daniel R. Kivlahan
116 ADTP
Seattle Veterans Administration Medical Center
1660 Columbian Way
Seattle, Washington 98108

Abstract

Alcoholic Subtypes:

Validity of Clusters Based on Multiple Assessment Domains

This study investigated the discriminant and predictive validity of empirically derived subtypes within a sample of male alcoholics. Cluster analysis was performed on a combination of variables from four assessment domains: demographics, drinking behavior, neuropsychological functioning, and psychopathology. Six subtypes were derived and shown to have discriminant validity with respect to measures which had not been used in the original cluster analysis. The six subtypes were found to have differential patterns of treatment outcome over 9-month follow-up, but only among patients randomly assigned to two week as opposed to seven week hospitalization. These findings have implications for future studies on identification and description of alcoholic subtypes, as well as for specific subtype-treatment matching.

Recent approaches to empirical derivation and validation of alcoholic subtypes have involved cluster analysis of data within a single multivariate assessment domain such as psychopathology (cf. Morey and Blashfield, 1981), neuropsychological functioning (Donovan et al., 1982), drinking behavior (Wanberg et al., 1977), or demographics (Gibbs, 1981). More recently, the utility of typologies emerging from single domains has been questioned (Meyer, 1983; Shaffer et al., 1983). It was the premise of the present study that the search for empirical subtypes should make use of the breadth of information that is obtainable early in the assessment process. In an effort to identify more clinically meaningful subtypes, we investigated the external and predictive validity of homogeneous subtypes empirically derived from a cluster analysis using data from all four of the previously studied assessment domains.

Method

Subjects

Subjects were 245 male veterans participating in a prospective treatment outcome study reported elsewhere (Walker et al., in press). Patients were randomly assigned to 2 or 7 week length of stay (LOS), and all patients contracted for 9 months of weekly outpatient aftercare. The sample was predominantly Caucasian (90.3%). Patients had a mean age of 45.7 years and 76.6% had completed at least a high school education. Most patients were from the Lower Middle of Lower Class (42.9% and 43.3%, respectively; Hollingshead, 1957). At admission, 31.5% were married and 20.8% of the sample was employed full-time. Drinking was reported as a problem for at least 10 years by 61.6% of patients, while 62% had received prior treatment for alcohol-related problems.

Assessment

Assessment was initiated during the first week after admission. Measures obtained for the cluster analysis were: age; Index of Social Position (SES; Hollingshead, 1957); average hours worked per week; years of problem drinking; days during the 3 months prior to admission on which 5 or more drink equivalents were consumed; the Alcohol Dependence Scale (Skinner & Allen, 1982); the Brain Age Quotient, an age adjusted index of problem solving ability comprised of Halstead-Reitan and Wechsler scales (Reitan, 1973); Verbal IQ prorated from the Vocabulary and Arithmetic scales of the WAIS (Wechsler, 1955); four clinical scales of the MMPI168 (Overall et al., 1973) which have characterized previously obtained MMPI subtypes of alcoholics (Morey & Blashfield, 1981): Depression, Psychopathic Deviate, Psychasthenia, and Schizophrenia; and a 13 item Social Desirability scale derived from the MMPI168 as an index of response style.

Patients drinking behavior, aftercare attendance, and employment status were assessed at follow-up interviews 3-, 6-, and 9-months after hospital discharge.

Cluster Derivation

Thirteen measures (see above) were entered into the CLUSTAN program (version 1C; Wishart, 1975) using Ward's (1963) minimum variance method with Euclidian distance as the similarity measure. Prior to analysis of the total sample, two split sample cluster analyses were performed. Inspection of the dendograms, clustering coefficients and profile means suggested a six cluster solution within each half of the sample. Although clustering coefficients for the entire sample analysis were compatible with a five cluster solution, inspection of profile means identified a smaller (N = 18), but distinctive sixth cluster which was retained for subsequent validation.

RESULTS

Means on all 13 clustering variables within each of the six clusters are presented in Table 1. Figure 1 presents the profiles of each of the six clusters using standard scores (i.e., relative to the total sample mean).

External validity of clusters was investigated with respect to pretreatment measures not included in the cluster analysis (Table 2). Cluster membership was not associated with marital status or reason for referral, but was related to the number of previous treatments for alcohol-related problems or psychiatric reasons, Drinking Related Locus of Control, Alcohol Use Inventory (AUI) Scale 13 (Drug Use), AUI Scale 6 (Drink to Change Mood), and Physical Symptoms of the Cornell Medical Index. In summary, results provide corroborating evidence of the distinctiveness of the cluster patterns on demographics, drinking-related behavior, psychopathology, and health.

Among the six clusters, Chi-square analyses showed a differential pattern of aftercare completion (Range = 22.2% to 55.3%; $\underline{\chi}^2$ (5) = 13, $\underline{p} < .05$) and follow-up employment status (Range = 11.5% to 60% employed full-time; $\underline{\chi}^2$ (10) = 19.4, $\underline{p} < .05$). A categorization of drinking outcome as successful (i.e. no more than one heavy drinking day over the nine month follow-up; 40.2% of the sample), relapsed (49.2%), or lost to follow-up (10.7%) did not show any overall difference among clusters, although the range of success rates was large (27.8% to 57.9%).

Differential treatment outcome was assessed over the nine months following hospital discharge relative to weekly aftercare, employment status and relapse status (Table 3). While the total sample showed no differential impact of length of stay, analysis based on the six clusters showed significantly different proportions of aftercare completion and full-time employment. Among patients randomly assigned to the briefer 2 week LOS, cluster membership was significantly associated with all three categorical outcome criteria: aftercare completion (Range = 11.1% to 60% completion rate; $\underline{\chi}^2$ (5) = 14.3, $\underline{p} < .02$), drinking outcome (Range = 19% to 60% success rate; $\underline{\chi}^2$ (10) = 18.3, $\underline{p} < .05$), and final employment status (Range = 6.7% to 65% full-time employment; $\underline{\chi}^2$ (10) = 18.4, $\underline{p} < .05$). Conversely, there were no significant associations within the sample assigned to 7 week LOS.

Discussion

Unlike most previous attempts to identify subtypes within the alcoholic population using a single assessment domain, the present study investigated clusters based on different patterns within four domains of assessment: demographics, drinking behavior, neuropsychological functioning, and psychopathology.

While it is tempting to speculate in a variety of ways about these six clusters, discussion will be limited to a brief description of the salient features of each subtype.

A sizeable (n = 52) younger group (Mean age = 35) with relatively intact cognitive function reported moderate to severe alcohol dependence symptoms and the most highly elevated MMPI168 scales (Mean T score = 81). The smallest cluster (n = 18) was very young (Mean age = 28) and reported less than average dependence, despite the heaviest pre-admission drinking. They also had somewhat lower cognitive functioning, above average social desirability response style and a subclinical peak on the Pd scale. Patients from these two groups had the highest rates of aftercare attrition. The oldest group (Mean age = 55) was predictably the most cognitively impaired, had the poorest employment record, and evidenced noteable depression and anxiety; however, they reported an unexpectedly recent onset of problem drinking (Mean = 10 years). Within this subtype there was a significant interaction between length of stay and outcome. Patients hospitalized for 7 weeks had much lower rates of relapse and aftercare attrition. Lest age seem to be the defining characteristic, it should be noted that the mean ages of the remaining three clusters were not significantly different (48.0, 49.4, and 50.9, respectively), yet the profiles and patterns of outcome were otherwise quite distinct. One of these groups (cluster 4) had the highest SES and cognifitive functioning with Depression the only elevated MMPI168 scale (Mean T score = 70.1). This group had the best outcome in terms of aftercare completion, full-time employment and drinking behavior. Both of the other clusters (3 and 5) were of equally low SES and had MMPI168 scores entirely within normal limits; however, there were large differences on pre-admission work status, heavy drinking days, chronicity, and cognitive

function. Within cluster 3, patients assigned to 2 week length of stay had consistently better outcome. In comparison, cluster 5 patients had more comparable outcomes regardless of length of stay. They were also more likely to complete aftercare but evidenced no better outcome on employment or relapse status than cluster 3 patients.

Conclusions

- Homogeneous subtypes of alcoholics can be derived using variables from multiple assessment domains. The present battery emphasized routinely available screening information (with the exception of the Brain Age Quotient).
- The six identified subtypes were shown to differ significantly on a variety of measures not used in the cluster analysis. This corroborates the distinctiveness of the groups on demographics, drinking behavior, psychopathology, and health; and indicated several variables that might be incorporated in future typologies (e.g., drinking related locus of control, health status, polydrug use, previous treatment history).
- The six clusters showed a differential pattern of outcome (particularly among those randomly assigned to 2 week hospitalization) as manifested in rates of aftercare completion, full-time employment and drinking relapse status.
- In contrast to undifferentiated tests of the impact of length of stay, analyses based on cluster membership produced a number of significant and provocative findings with implications for patient-treatment matching.
- Empirically derived typologies based on multiple assessment domains should be investigated for their utility in more appropriately matching treatments to patient subtypes.

References

Donovan, D., Walker, R., Kivlahan, D., & Umlauf, R. Derivation and Validation of neuropsychological clusters among male alcoholics. Paper presented at the annual meeting of the American Psychological Association, Washington, D.C., August 1982.

Gibbs, L. The need for a new design for evaluating alcoholism treatment programs. Drug and Alcohol Dependence, 1981, 8, 287-299.

Hollingshead, A. Two-factor index of social position. Unpublished manuscript, 1957. (Available from the Department of Sociology, Yale University, New Haven, Connecticut, 06520.

Meyer, R. Typologies in alcoholism. International Journal of the Addictions, 1983, 18, 235-259.

Morey,L. & Blashfield, R. Empirical classifications of alcoholism: A review. Journal of Studies on Alcohol, 1981, 42, 925-937.

Overall, J., Hunter, S., & Butcher, J. Factor structure of the MMPI-168 in a psychiatric population. Journal of Consulting and Clinical Psychology, 1973, 41, 284-286.

Reitan, R. Behavioral manifestations of impaired brain function in aging. Paper presented at the annual meeting of the American Psychological Association, Montreal, Quabec, 1973.

Shaffer, J., Wegner, N., Kinlock, T., & Nurco, D., An empirical typology of narcotic addicts. International Journal of the Addictions, 1983, 18, 183-194.

Skinner, H. & Allen, B. Alcohol dependence syndrome: Measurement and validation. Journal of Abnormal Psychology, 1982, 92, 199-209.

Walker, R., Donovan, D., Kivlahan, D., & O'Leary, M. Length of stay, neuropsychological performance, and aftercare: Influences on alcohol treatment outcome. Journal of Consulting and Clinical Psychology, 1983, 51, in press.

Wanberg,K., Horn, J., & Foster, F. A differential assessment model of alcoholism: The scales of the Alcohol Use Inventory. Journal of Studies on Alcohol, 1977, 38, 512-543.

Ward, J. Hierarchical grouping to optimize an objective function. Journal of the American Statistical Association, 1963, 58, 236-244.

Wechsler, D. Wechsler Adult Intelligence Scale: Manual. New York: Psychological Association, 1955.

Wishart, D. A general tripartite clustering method and similarity generating function (Statistics Division Report #R-31). London: Civil Service Department, 1972.

TABLE 1

MEANS FOR 6 CLUSTERS ON 13 CLUSTERING VARIABLES

VARIABLES	CLUSTERS					
	1	2	3	4	5	6
Age	27.9	35.4	48.0	49.4	50.9	54.6
SES[1]	59.1	57.5	57.6	37.2	58.4	59.6
Average hours worked[2]	21.3	19.5	9.8	21.2	19.9	5.5
Heavy drinking days[2]	70.3	44.2	52.1	59.1	24.4	63.5
Chronicity[3]	7.1	12.4	14.1	12.6	21.5	10.1
Alcohol dependence[4]	14.9	20.3	11.6	14.5	18.9	16.6
Brain Age Quotient[5]	87.1	90.1	97.7	101.0	84.6	74.5
Verbal IQ[6]	99.2	107.8	113.5	119.8	105.3	101.9
Depression[7]	56.0	80.7	57.1	70.1	67.6	80.6
Psychopathic Deviate[7]	65.1	78.1	58.1	66.5	63.9	70.1
Psychasthenia[7]	54.2	81.9	53.2	64.4	60.0	74.0
Schizophrenia[7]	58.2	82.9	51.9	64.3	57.7	68.7
Social Desirability[7]	10.9	6.9	11.8	9.6	10.2	8.4
Cluster size	18	52	43	38	59	35

[1] Hollingshead (1957) Index of Social Position

[2] Based on 90 days prior to admission

[3] Self-report of years of problem drinking

[4] Alcohol Dependence Scale (Skinner & Allen, 1982)

[5] Reitan, 1973

[6] Pro-rated from WAIS Vocabulary and Arithmetic

[7] From MMPI 168 (Overall et al., 1973)

TABLE 2. EXTERNAL VALIDITY OF CLUSTERS BASED ON CONCURRENT MEASURES OF DRINKING BEHAVIOR, TREATMENT HISTORY, AND SOMATIC SYMPTOMS.

	Previous Alcoholism Treatment (in percent)	Previous Psychiatric Treatment (in percent)	DRIE[1] Total Score	CMI[2] Physical Index	AUI[3] Drug Use	AUI[3] Drink to Change Mood
6	54.3	14.3	6.4^{bc}	28.2^{c}	$.4^{b}$	4.9^{b}
5	78.0	20.3	5.4^{abc}	26.5^{c}	$.9^{b}$	4.6^{ab}
4	52.6	18.4	6.9^{c}	20.5^{ab}	$.6^{b}$	4.1^{ab}
3	55.8	11.6	4.3^{a}	16.9^{a}	$.6^{b}$	3.8^{a}
2	61.5	38.5	6.8^{c}	24.5^{bc}	2.3^{a}	6.1^{c}
1	55.6	27.8	4.4^{ab}	13.1^{a}	3.1^{a}	4.2^{ab}
Total	61.6*	22.0**	5.8***	22.7****	1.2****	4.7****

[1] Drinking Related Locus of Control Scale (Donovan & O'Leary, 1978). Higher scores indicate more external locus of control.

[2] Cornell Medical Index

[3] Alcohol Use Inventory (Wanberg, Horn & Foster, 1977).

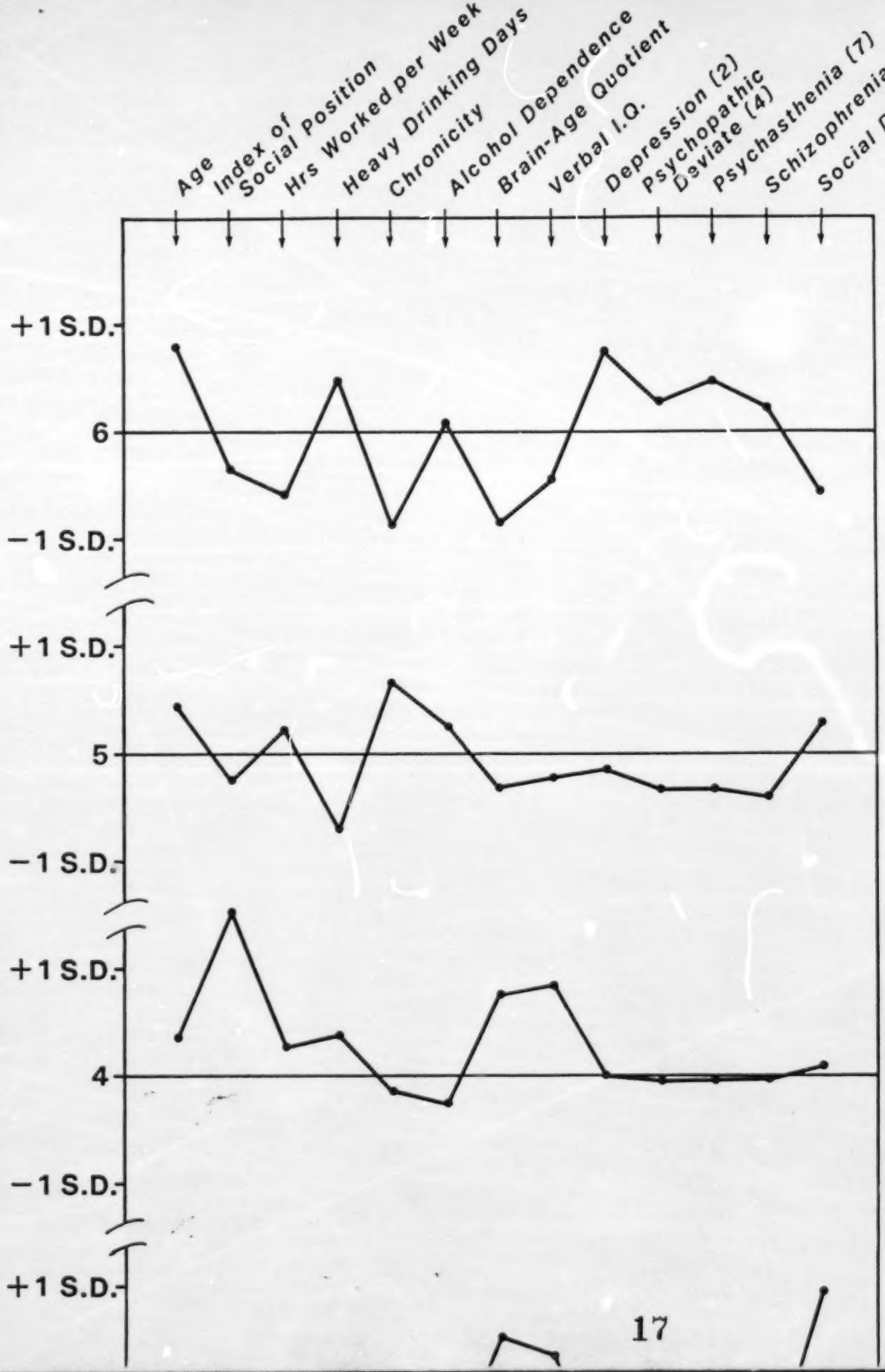
*$p<.10$ **$p<.05$ ***$p<.01$ ****$p<.001$

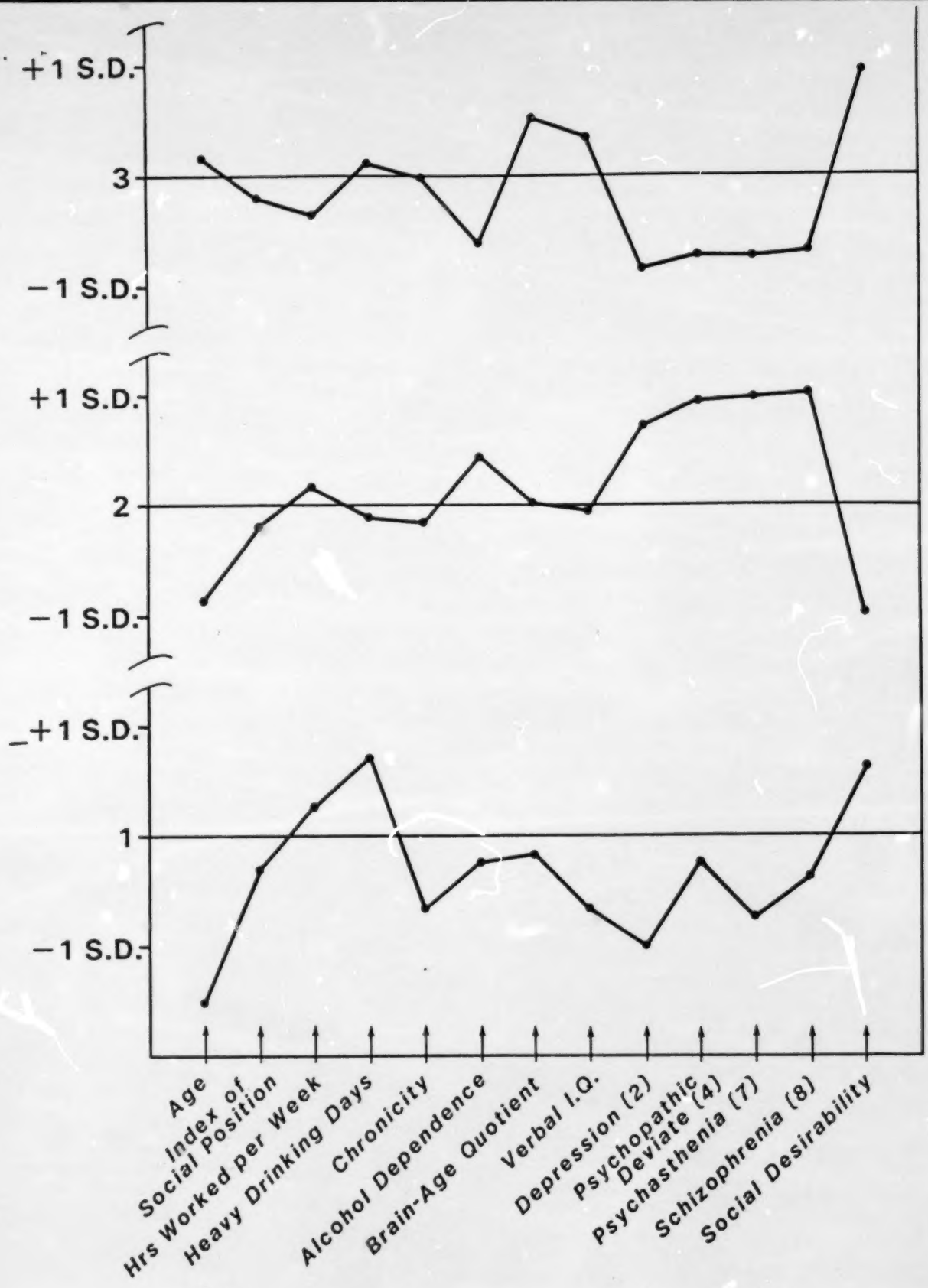
Note Scores with different superscripts are significantly different at $p<.05$ by Duncan's Multiple Range Test

TABLE 3. PREDICTING VALIDITY OF CLUSTERS FOR TOTAL SAMPLE AND WITHIN TWO WEEK AND SEVEN WEEK INPATIENT LENGTH OF STAY

	Aftercare Completion (% Completers) Total (N=245)		Employment Status (% Full Time) (Total (N=192)		Relapse Status (% Successful) Total (N=245	
	2 Week (N=117)	7 Week (N=128)	2 Week (N=91)	7 Week (N=101)	2 Week (N=117)	7 Week (N=128)
6	31.4		11.5		31.4	
	19.0	50.0	6.7	18.2	19.0	50.0
5	44.1		37.5		37.9	
	52.2	38.9	41.2	35.5	45.5	33.3
4	55.8		60.0		57.9	
	60.0	50.0	65.0	53.3	60.0	55.9
3	30.0		41.2		44.2	
	40.0	21.7	50.0	33.3	60.0	30.4
2	25.0		43. 2		36.5	
	24.0	25.9	33.3	52.6	36.0	37.0
1	22.2		58.3		27.8	
	11.1	33.3	60.0	57.1	22.2	33.3
TOTAL	35.9**		41.1**		40.2	
	36.4**	35.4	41.8**	40.6	41.9**	38.6

** p<.05


Age
Index of Social Position
Hrs Worked per Week
Heavy Drinking Days
Chronicity
Alcohol Dependence
Brain-Age Quotient
Verbal I.Q.
Depression (2)
Psychopathic Deviate (4)
Psychasthenia (7)
Schizophrenia (8)
Social Desira'
+1 S.D.
6
−1 S.D.
+1 S.D.
5
−1 S.D.
+1 S.D.
4
−1 S.D.
+1 S.D.


+1 S.D.
3
−1 S.D.
+1 S.D.
2
−1 S.D.
+1 S.D.
1
−1 S.D.
Age
Index of Social Position
Hrs Worked per Week
Heavy Drinking Days
Chronicity
Alcohol Dependence
Brain-Age Quotient
Verbal I.Q.
Depression (2)
Psychopathic Deviate (4)
Psychasthenia (7)
Schizophrenia (8)
Social Desirability